

NEANURID COLLEMBOLA OF AUSTRALIA PRESERVED IN THE SOUTH AUSTRALIAN MUSEUM

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SUMMARY

Collembola of the Family Neanuridae of Australia, collected by late Prof. Womersley and preserved in the South Australian Museum have been studied from a new viewpoint. Nine forms including four new species have been detected and a new diagnosis is given for each species.

By the kindness of Mr. D. H. Murphy and Mr. G. F. Gross who have sorted out the Neanurid material of late Prof. H. Womersley, preserved in the South Australian Museum, I was privileged to investigate the precious material treated herein. Twenty-three tubes containing alcohol material and two boxes of 48 microscopic slides have been studied. Some of them had been rendered quite useless by desiccation, but others were in good enough condition to warrant this taxonomic work. The results of their examination follow.

The Neanurid collembola of Australia may be split into two large groups. The first of these is the *Lobellini*, in which the body tubercles do not form areolae. To this group belong *L. rosacea*, *newmani* and *austratica*. A feature common to all these species is that the mouth parts are strongly reduced, the mandible is bi- or tricuspidate apically and the maxilla is styliform. To this group I have already given the name *Propeanura* (Yosii, 1956, p. 46). Whether this is a genus or subgenus is the matter of discussion, but I am using it as a subgenus for the moment. In all events *Propeanura* is the predominant group in the Australian continent. The second group is the *Neanurini*, in which the body tubercles are divided into areolae, more or less. With the exception of *Neanura muscorum*, whose existence in Australia might be reckoned as an introduction from Europe, there are some six further species to be included in this group. They are *N. cirrata*, *wellingtonia*, *schoetti*, cf. *novae-caledoniae*, *womersleyi* and *grossi*. In contrast to those of the northern hemisphere all of them are without body colour when preserved in alcohol. Their body tubercles are strongly warty in profile, especially upon the posterior body segments. Thus they would comprise a special natural group within *Neanura*, and which is nearly related to *Bilobella* in appearance. However, I could not find any fundamental difference to separate them from the coloured section of the genus. This problem must be studied in future.

1. *Lobella (Propeanura) rosacea* (Schött, 1917)***Achorutes rosaceus* Schott 1917**

The species was described from North Queensland. Many preparations labelled as *rosaceus* by H. Womersley are present. However they differ from the Schött's description by having an inner tooth upon the unguis. The real *rosaceus* seems to be still unrecognized. *Achorutes rosaceus* from New Hebrides (Womersley, 1937) is represented by an alcohol preserved specimen. It is not properly preserved and, although very near *L. rosaceus*, cannot be identified with certainty. *Lobella rosacea* must remain a *species inquirenda* for the moment.

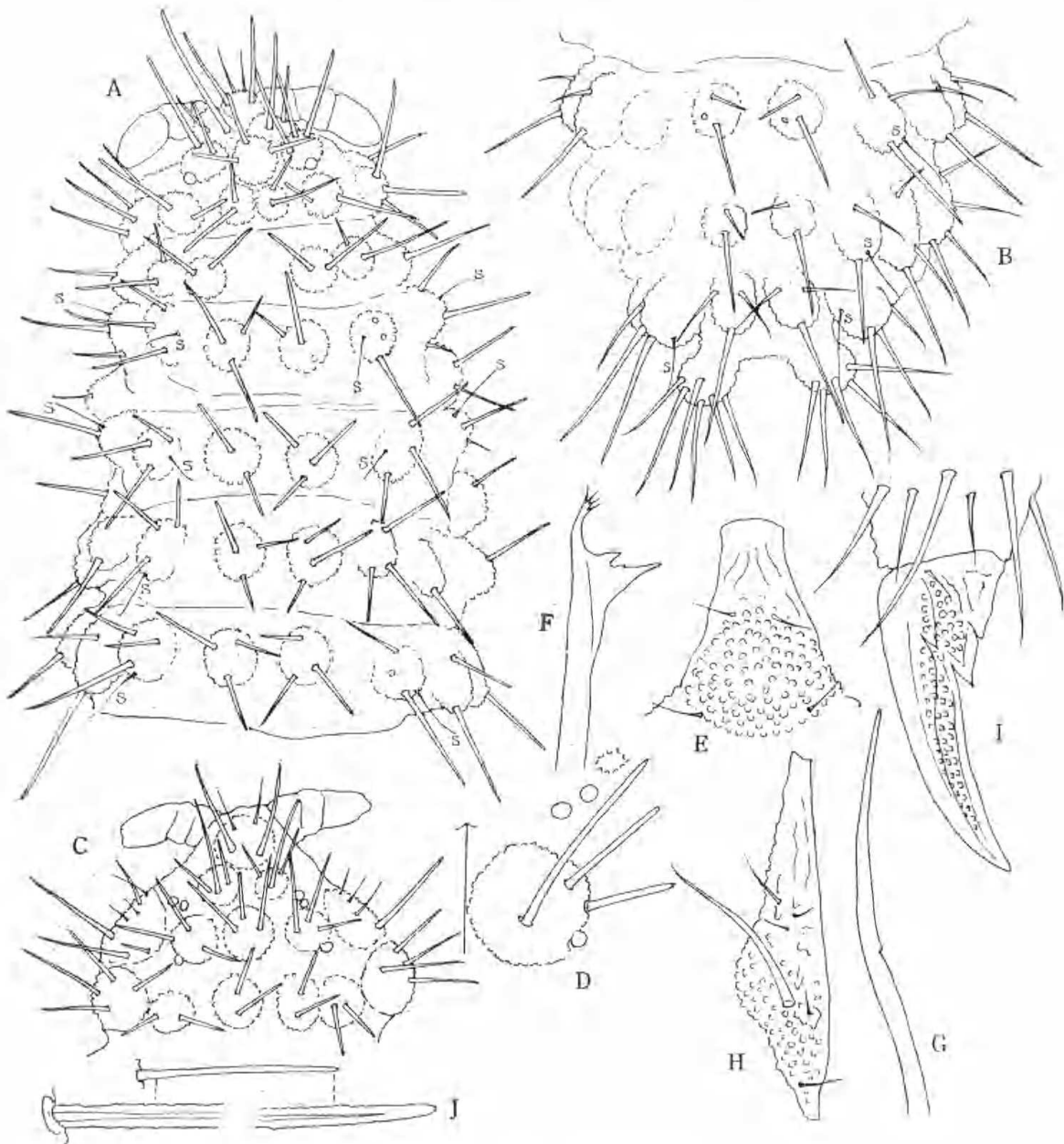
2. *Lobella (Propeanura) newmani* (Womersley 1933)

Fig. 1

***Achorutes newmani* Womersley 1933**

Fifteen examples in alcohol and four slides labelled as cotype were seen of this large species of *Lobella*. The alcohol material seems to have been once dessicated, as the specimens are very brittle and partly shrivelled. By handling it carefully in lactic acid the following characters are observed.

Body length 3.0 mm, breadth 1.6 mm, the outline is rather elliptical. Colour dirty white, but creamy white in life (*vide* Womersley). Antennae subequal to head. Ant. IV with 3 apical bulbs and 8 well differentiated sensory setae in the usual arrangement. Ant. III-organ normal, p-, d-, v-seta all present. Buccal cone well developed. Labrum short, truncate apically and with 2 + 2 setae, the distal pair poorly developed, not much larger than the other. Mandible elongate, apically tridentate weakly and the apical tooth is divided into 3-4 minute teeth. Maxilla narrowly pointed. Labium narrow, pointed distally, all setae except one pair are small. Eyes 3 + 3, uncoloured, anterior 2 remote from ocular tubercle. Post-antennal field vestigially present. Unguis with well developed dorsal side. Inner side densely granulated until near apex. Inner tooth one always present (described originally as absent). A pair of conspicuous lateral teeth are present near the basis and this character would serve as a good mark of *newmani*. Ventral tube with 4 + 4 setae. Furcal rest is a median, rounded hump upon which 5 setae (3, 1 + 1) are located. All segmental tubercles are well developed, they are hemispherical, but often mammillate upon posterior abdominal segments. Upon head all tubercles including a pair of antennal ones are present. Central tubercle bears 3 subequal setae. As shown in the figures all tubercles bear the maximum number of setae, there are small difference of length and form among them,



EXPLANATION OF FIGURES

FIG. 1

Lobelia (Propeanura) newmani (Womersley), Cotype.

A, Anterior part of body; B, Posterior part of body; C, Head; D, Eyes and postantennal field; E, Labrum; F, Mandible; G, Maxilla; H, Labium; I, Mid claw; J, body seta.

which is also true of the body setae. The antennal tubercle bears 3 setae, the median (dorsal) tubercles of occipital region with 2 setae each. All the dorsal tubercles of body are well represented, th. I with 3 + 3 tubercles having 2, 2, 1 setae. Upon th. II, III there are 4 + 4 tubercles having 3, s + 3, 2, 1-2 setae. Abd. I-III with 4 + 4 tubercles having 3, 3 + s, 2, 1-2 setae. Upon abd. IV the tubercles are

elongate and with 2, 2 + s, 3, 4 setae each. Upon abd. V 2 + 2 distinct tubercles having 3, s + 3 setae. Another pair of well developed tubercles are located ventrally and can be seen from above (when the example is slightly pressed). A pair of tubercles of abd. VI are well developed, well separated and capitate in outline. The body setae are long, there are no large difference between long and short setae, they are parallel-sided, apically obtuse, and slightly rugose throughout their whole length.

L. newmani is a peculiar species by virtue of the well developed chaetal arrangement of the body. It is near *L. sauteri* Börner of Japan in the well developed tubercles of the body, but the mouth parts are quite different. Some examples from other localities of Australia and labelled as *L. newmani* proved to be different to this species. Examples from Belgrave, Victoria have smaller body setae, without the tooth upon the unguis. Those from Waterfall Gully, Belair and Fern Tree Gully are near *newmani*, but the unguis is without lateral teeth and the body setae are smooth, tapering and pointed on apex.

3. *Lobella (Propeanura) australica* sp. n.

Fig. 2

Four expls. Perth West Australia VII, 1935 K. Morris leg.

One expl. Belgrave, Victoria 19.IV.1931 H.G.A. leg.

Body long, somewhat similar to *Oxychiurus* in outline. Length 2.4 mm, breadth 0.9 mm. Colour of alcohol preserved specimen dirty white. Antennae short, ant.: head as 13:20. Antennal ratio as 1:1:2. Distal segment with 3 apical bulbs and 7 curving, blunt sensory setae. p-seta present. Ant. III-organ and d-, v-seta all normal. Head with 2 + 2 large, unpigmented eyes, situated longitudinally. Post-antennal field very small, but really present. Buccal cone protruded and apically pointed. Labrum not observed. Mandible feeble, apically with an inner lobe, and the apical tooth is finely denticulated. Maxilla styliform. Unguis carinate dorsally, without inner tooth and its inner side is without structures. Ventral tube with 4 + 4 setae. Furcal rest is a median rounded area, feebly defined and with 1 + 1 setae. All body tubercles are reduced, represented by a roughly granulated area, where setae are to be found. Upon head only a median transverse area between eyes can be defined. Occipital setae in a row, without tubercles at all. From the trunk no dorsal tubercle (= area) can be defined. Th. I with 4 + 4 setae, without granulated area. Th. II, III is with 3 + 3 ant. = post. < med.) dorsal setae, subdorsal area rounded and with s + 1 setae. Sublateral area with 2 + s and lateral area with 3 setae. Upon abd. I-IV dorsal group of setae are 2 + 2 (ant. < post.), subdorsal with 1 + s, sublateral 1 and lateral 3-4

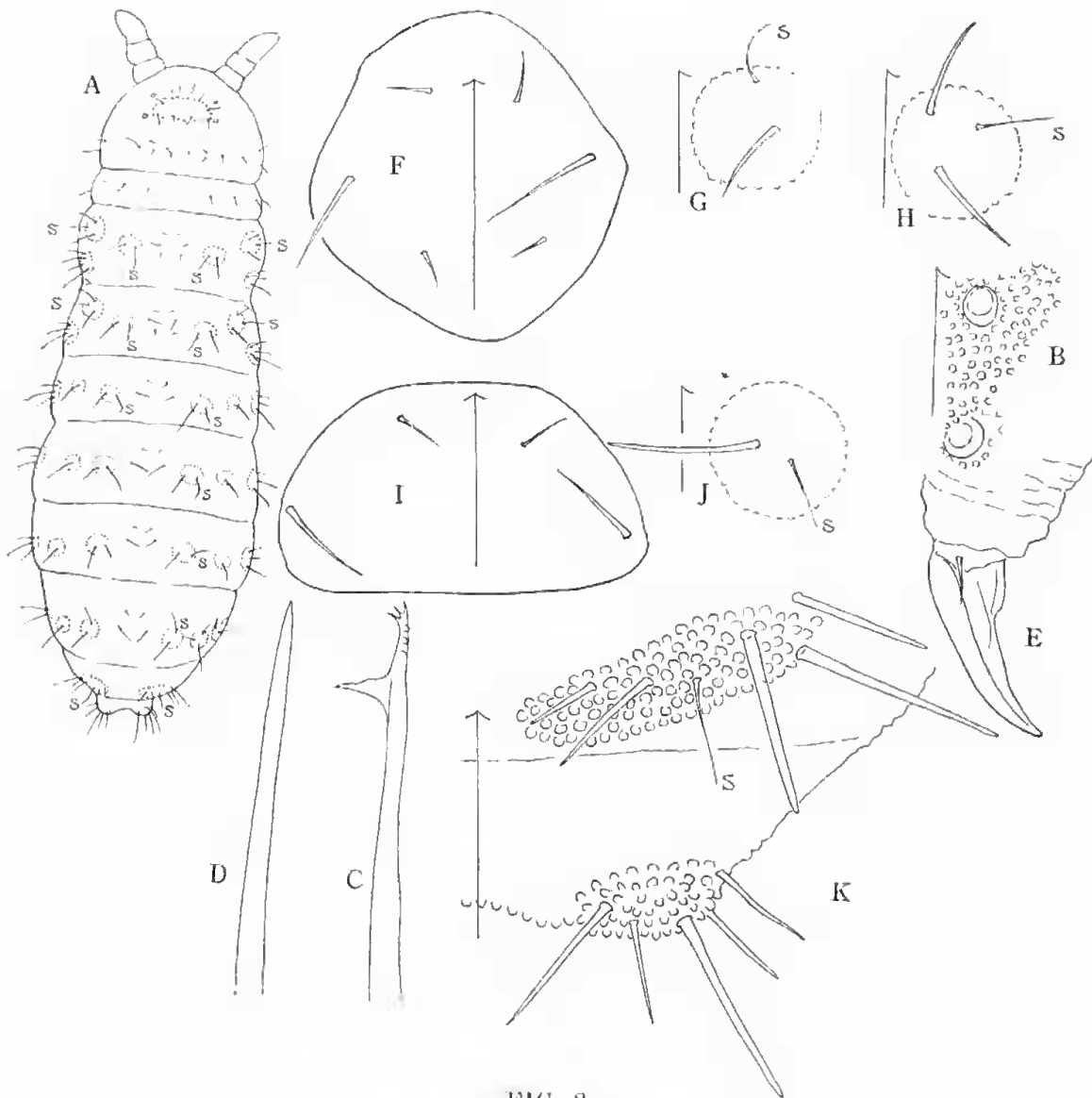


FIG. 2

Lobella (Propeanura) australica sp. n.

A, Dorsal side; B, Eyes and postantennal field; C, Mandible; D, Maxilla; E, Fore claw; F, Dorsal group of setae of th. III; G, Subdorsal tubercle of th. III; H, Sublateral tubercle of th. III; I, Dorsal group of setae of abd. III; J, Subdorsal tubercle of abd. III; K, Abd. V and VI (right half).

setae. Abd. V is very unique, dorsal and lateral tubercles are quite reduced to an oblique area postero-lateral to the segment, where $5 + s$ setae are located. The slender s.s. is the third seta of them. Abd. VI bears a pair of low tubercles, remote from each other. All body setae are short, uncoloured and setaceous. Larger ones are often with a sign of roughness.

The examples were labelled as *N. rosacea* Schött by Womersley.

No other *Propeanura* species with such reduced segmental tubercles are yet known. In this respect the present species is very characteristic.

4. *Neanura muscorum* (Templeton, 1835)

Achorutes muscorum Womersley 1939

Seven expls. Mount Wellington, Tasmania 9.XII.1937.

These examples have been compared with the description of Stach 1951 and with two examples of this species from Belgium. In all details they agree. Thus the species certainly occurs in Tasmania. Probably it is an introduction from Europe.

5. *Neanura* cf. *cirrata* (Schött, 1917)

Achorutes cirratus Schött 1917

Fig. 3

N. cirrata has been described from North Queensland, Schött's fig. 10 (p. 8) indicates a very peculiar feature of abd. VI, which cannot be detected in any examples of the material at hand. The exact determination must be reserved. Examples determined by Womersley as this species have the following characters. (The description is based on four examples from Glen Osmond, South Australia.)

Body length from 1.8 to 3.0 mm. Large examples are more intensely granulated and each of the granules strongly protrude from the surface, while in smaller examples with a well developed genital orifice the granulation is not so cubically produced. Body colour white in alcohol. Upon head no antennal tubercles. Frontal tubercle without a central seta. Eyes 2 + 2, unpigmented. A median pair of occipital tubercles are united in one mass medially, having 1 + 1 seta on it. Buccal cone cuspidate. Labral and labial setae as in *N. wellingtonia*. Mandible bidentate apically and slightly denticulated. Maxilla styliform. Unguis without tooth and the inner side is granulated. Furcal rest is a median, low, transverse swelling of the integument. Th. I with 1, 2, 1 setae. Th. II, III with 3, s + 3, 2 + s, —setae. Upon abd. I-III with 2, 2 + s, 3,—setae. Upon abd. IV one seta is lacking from the subdorsal tubercle (1 + s) and the s.s. is located proximal to one ordinary body seta. Upon abd. V dorsal tubercles are united in one central mass having 2 + 2 barbed setae. s.s. lies on the lateral tubercle. Abd. VI is not much produced and granulated all over. Body setae are rather short, thick and intensely barbed all over.

This species differs from *N. cf. novae-caledoniae* by the union of a pair of tuberculated areas of abd. VI. Womersley's *A. hirtellus*

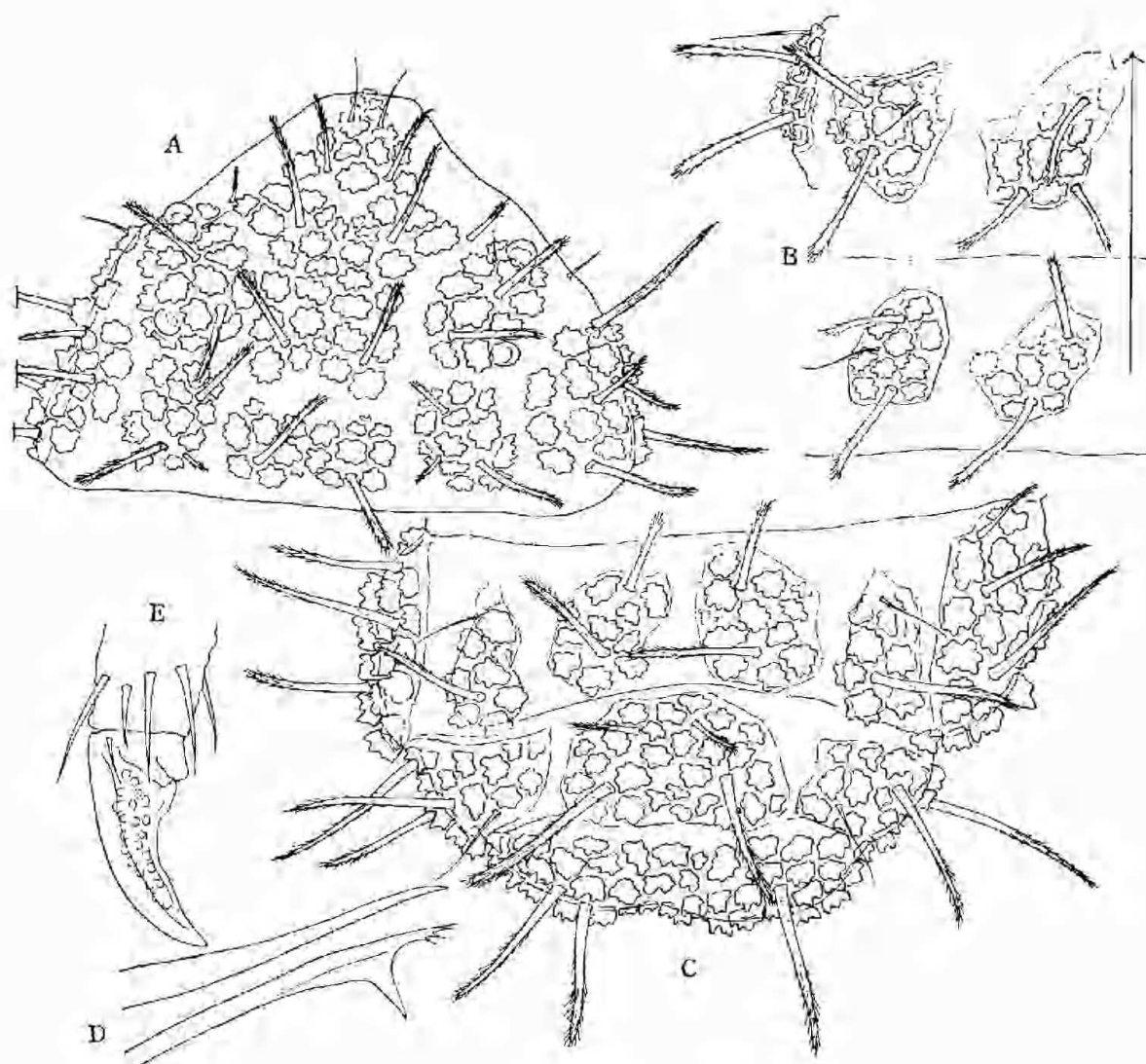


FIG. 3

Neanura cf. *cirrata* (Schött) from Belgrave, Victoria.

A, Head; B, Tubercles of th. III and abd. I (left half); C, Abd. IV, V and VI; D, Mandible and maxilla; E, Mid claw.

var. *cirratus* in 1935 (p. 209, fig. e-h) would be another independent species. In his fig. g he has shown a pair of dorsal tubercles of abd. V as widely separated to each other.

6. *Neanura* cf. *novae-caledoniae* Yosii, 1960

Four expls. Long Gully, South Australia 11.VI.1938 H. Womersley leg.
Four expls. Mylor, South Australia 14.IX.1935 H. Womersley leg.

These examples are very near *N. novae-caledoniae* in the distribution of segmental tubercles and in the form of body setae. The differences are as follows. Body larger, 2.5 mm in length or more.

All body setae are larger and longer, although the serration of them and the rugose structure are not different. Compared to fig. 2, 3 of my description in 1960 the anterior margin of the frontal (= central) tubercle of head bears 4 stout setae instead of the 2 in the New Caledonian specimens. The clypeal (= apical) tubercle of the head bears 1 + 1 smooth anterior setae instead of the one median seta of the cited species. Subdorsal tubercle of the occipital row of head bears 3 setae in both lots, but one of them lying on its dorsal side is short and setaceous in New Caledonian examples, well developed and modified in the Australian examples. Upon abd. V the dorsal tubercles are united into one central mass and beset with 2 + 2 setae. In New Caledonian examples the anterior pair of setae are smooth and setaceous, while they are rugose and roughly barbed as the posterior pair in the present examples. In other details including mouth parts, form and sculpture of unguis, etc., no difference is to be detected between them.

7. *Neanura wellingtonia* Yosii sp. n.

Fig. 4

Five alcohol specimens and 2 slides from Mount Wellington, Tasmania, 1936 J. W. Evans leg. They are cotypes of Womersley's *Achorutes hirtellus* var. *wellingtonia* described in 1936.

Body length up to 4.0 mm but usually about 2.8 mm. Body colour unknown, alcoholic specimens are white. Ant.: head as 3:5. Ant. IV with 3 end bulbs apically and with 8 curving sensory setae dorsally in usual arrangement. p-seta small. Ant. III-organ is a pair of rounded rods in a groove, accompanied by blunt d- and v-seta. Ant. II and I dorsally granulated and with modified setae. Buccal cone acutely protruded. Labrum elongate, with 1 + 1 strong apical and 1 + 1 weak basal setae. Mandible slender, with 3 apical teeth. Maxilla styliform. Labium smooth, with 1 + 1, 3 + 3, 2 + 2, 4 + 4 setae, the basal one very strong. Unguis carinate, without inner tooth and its inner side is minutely granulated. Ventral tube with 4 + 4 setae. Furcal rest a median transverse tubercle with paired granulated spots. It is located near the posterior margin of abd. III, posterior to a row of 5 setae. Dorsal side of the trunk with distinctly separated segmental tubercles. Upon head the clypeal tubercle is fused with the frontal tubercle and the ocular tubercle is slightly separated from it. Eyes 2 + 2, unpigmented. Dorsal tubercle of the occipital row dorsally fused in one mass. Others as in case of *N. novae-caledoniae* Yosii. Th. I with 3 + 3 tubercles, having 1, 2, 1 setae each. Th. II, III as usual for the group, with 3, s + 3, 3 + s,—setae. Abd. I-III tubercles have 2, 2 + s, 2,—setae each. Abd. IV lacks one seta of the

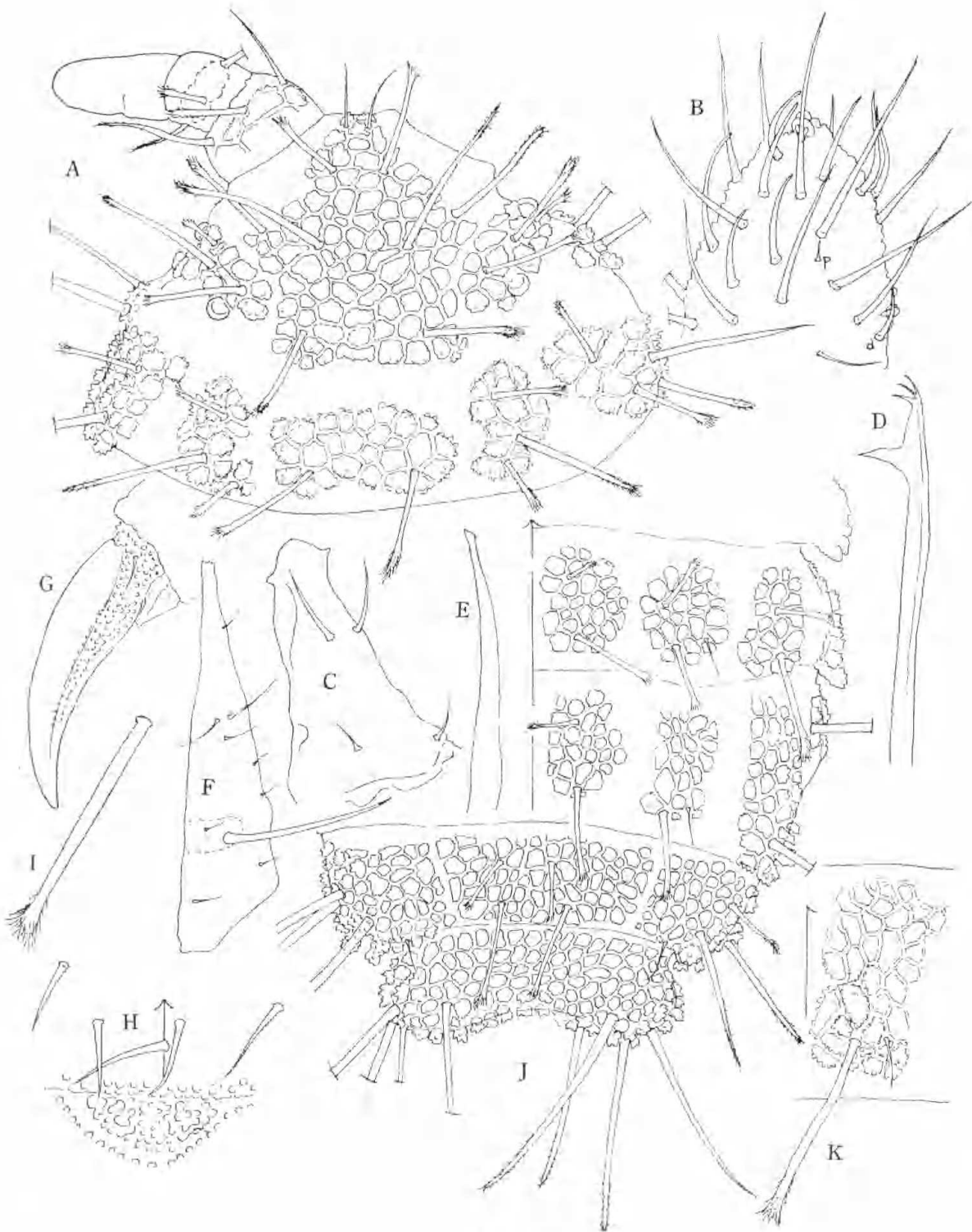


FIG. 4

Neanura wellingtonia sp. n.

A, Head; B, Antennal end; C, Labrum; D, Mandible; E, Maxilla; F, Labium; G, Mid claw; H, Furcal rest; I, Body seta from dorsal tubercle of abd. I; J, Posterior part of abdomen (abd. III-VI3); K, Subdorsal tubercle of abd. IV showing the position of s.s.

subdorsal tubercle and s.s. is placed at the same level of one seta. Upon abd. V an unpaired median tubercle is placed with $2 + 2$ setae, the lateral tubercle is slightly separated from it and with a weak s.s. on dorsal side. Abd. VI is broad, a paired tubercle is well separated from it and its surface is uniformly fielded and granulated all over. Body setae strong, hirsute and somewhat patellate apically.

This strikingly large species is apparently endemic to Tasmania. It is to be separated from *N. cf. cirrata* (Schött) and others of this group by the fusion of clypeal and frontal tubercles of the head, by the form of patellate body setae and especially by the position of s.s. upon subdorsal tubercle of abd. IV.

8. *Neanura womersleyi* sp. n.

Fig. 5

One expl. Inglewood, South Australia 23.V.1938 H. Womersley leg.

Body length 1.4 mm. Totally white in alcohol. Outline of the body rather elongate, breadth being 0.4 mm on abd. I. Ant.: head subequal in length. As the antenna is shrivelled, details are not clearly visible. Yet the terminal segment has 3 apical bulbs and many curving, blunt sensory setae. d- and v-seta are long, similar to other sensory setae. Eyes $2 + 2$, unpigmented. Buccal cone protruded, labrum apically converging, with $3 + 3$ setae, the most distal pair longer than others. Mandible bidentate, the apical tooth somewhat serrated. Maxilla styliiform. Labium usual, the basal portion equally granulated. Unguis strongly carinate dorsally, without inner tooth and the inner side is practically smooth. Ventral tube with $3 + 3$ setae. Furcal rest is a median hump with $2 + 2$ setae and a small, rounded tubercle is posteriorly attached to it. Female genital field elliptical, with ca. 16 simple setae. Anal flap distinctly divided into two lobes having 10 setae each. Body tubercles very characteristic. Upon head the frontal (= central) and ocular tubercles are united in one mass, the eyes are located at the lateral margin of it. Occipital tubercles are very reduced, the dorsal pair almost imperceptible and united with the subdorsal one. Upon th. I the dorsal tubercle is absent, subdorsal one very prominent. Each with 1 seta. Upon th. II, III dorsal tubercle bears $1 + 1$ large and $2 + 2$ minute setae, subdorsal one with $2 + s$, sublateral with $3 + s$, lateral with 1 large and 2 usual setae. Upon abd. I-III dorsal tubercles are all reduced, represented by 1 large and 1 minute setae, subdorsal with 1 large, 1 small and 1 s.s. Upon abd. IV dorsal tubercle is again vestigial, subdorsal with 1 large seta and s.s. The most conspicuous character is the tubercles of abd. V, where dorsal and lateral tubercles are united in one mass, leaving a narrow median streak, which divides the tubercle of each side. s.s. is located

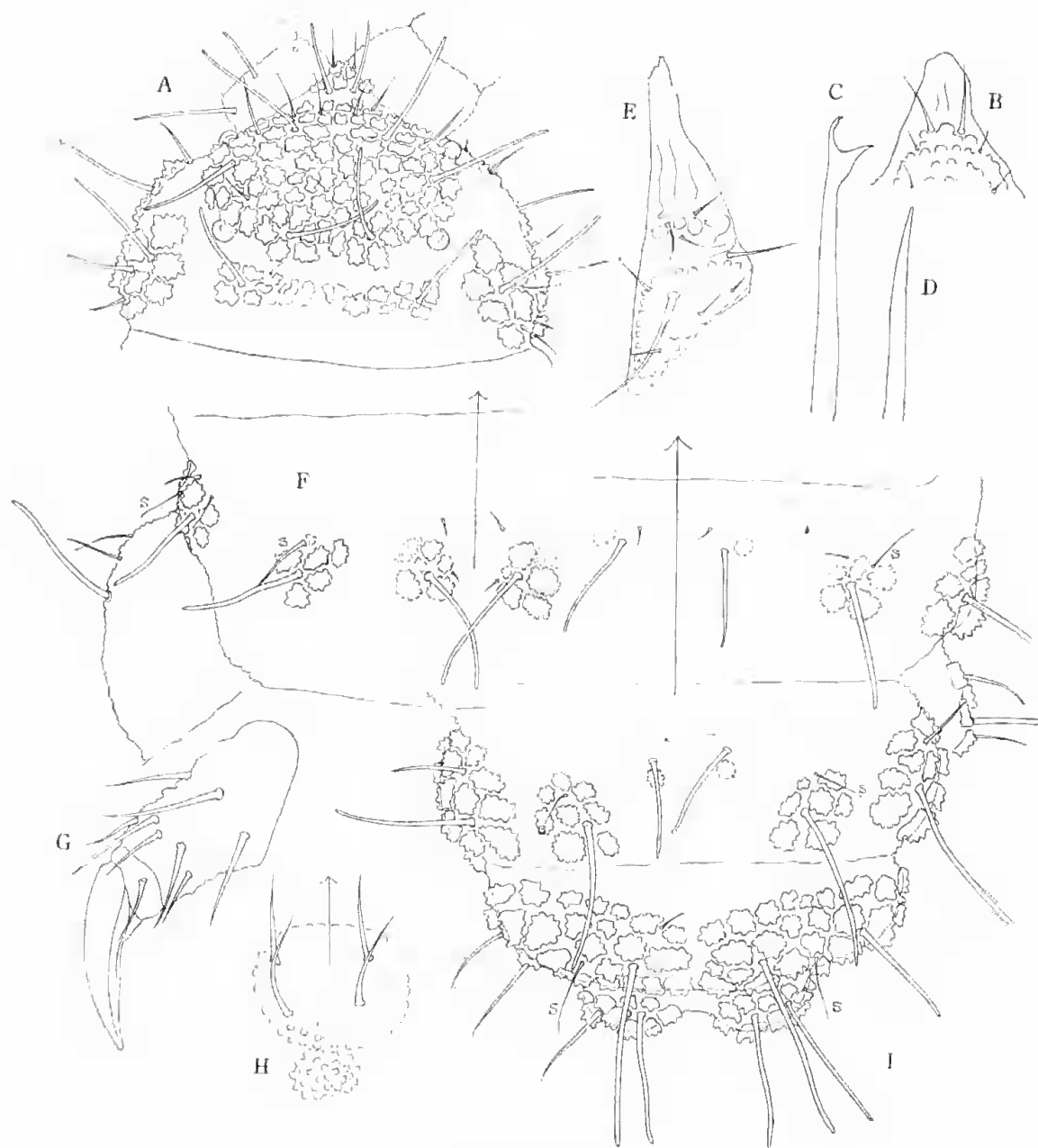


FIG. 5

Neanura womersleyi sp. n.

A, Head; B, Labrum; C, Mandible; D, Maxilla; E, Labium; F, Th. III (left half); G, Mid claw; H, Furcal rest; I, Posterior part of abdomen.

at about the middle of them. Abd. VI is half concealed by abd. V, divided by a broad median smooth area. Large body setae not converging, obtusely rounded apically and always smooth. s.s. short. All body setae uncoloured.

This species is very unique in the structure of abd. V and other features.

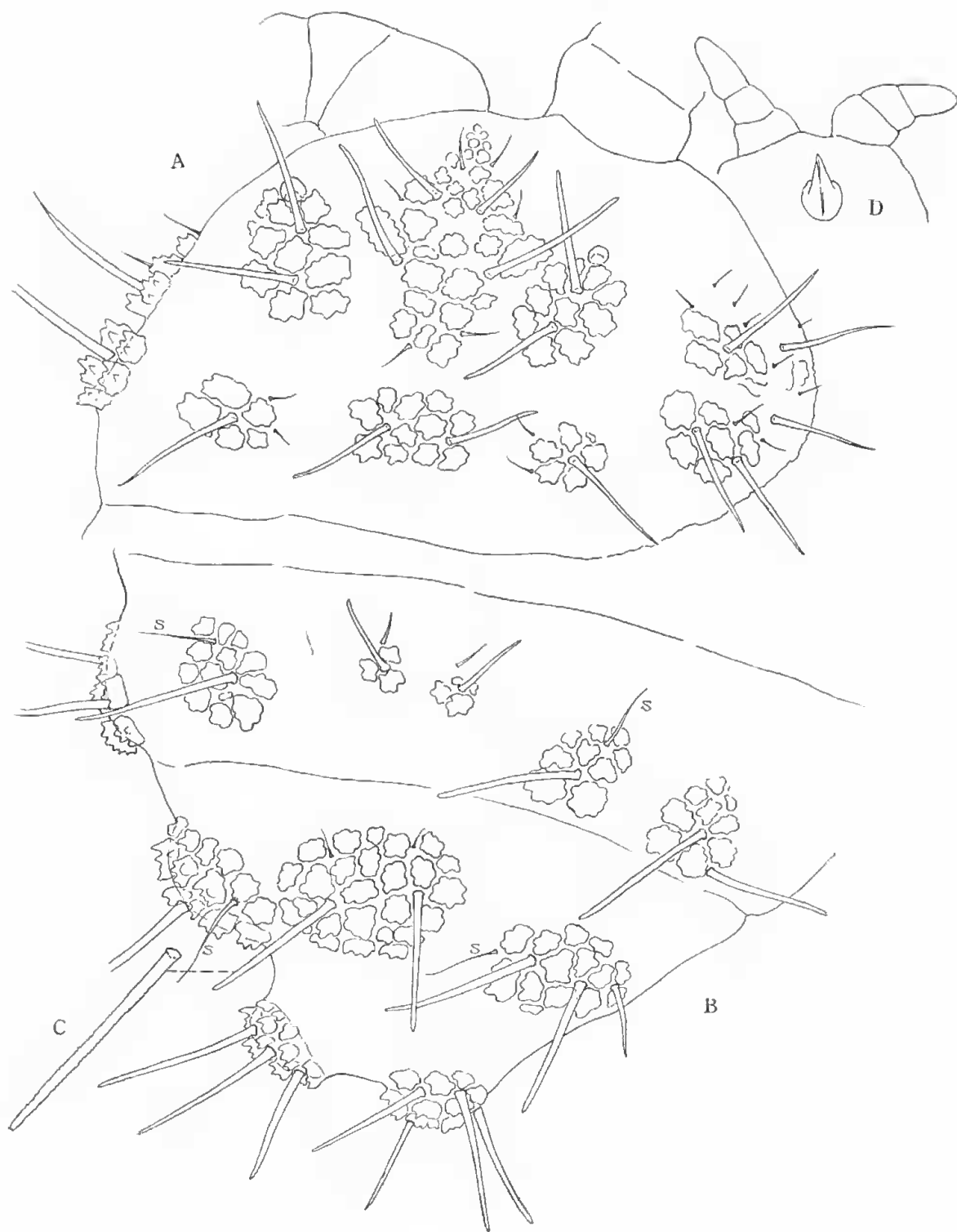


FIG. 6

Neanura grossi sp. n.

A, Head; B, Abd. IV-VI, C, Body seta; D, Buccal cone.

9. *Neanura grossi* sp. n.

Fig. 6

One expl. Bells Creek, Victoria 24.VI.1941.

Body length 1.8 mm. White in alcohol. Ant.: head as 3:5. Antennae usual in every respect for the group and sensory setae of ant. IV not coiled. Buccal cone very poorly developed, far behind the fore margin of the head. Labral and labial setae feeble, not exactly determined. Mandible feebly bidentate apically, maxilla styli-form when observed by transmitted light. Unguis carinate, without inner tooth and the inner side is almost without granulation. Ventral tube with $2 + 2$ (?) setae. Furcal rest absent. Body tubercles very peculiar and quite different from other species. Upon head clypeal tubercle slightly divided from the small frontal tubercle. The latter is inversely trapezoid in form, without central seta and the posterior pair of setae are small and setaceous. Ocular tubercle with 2 setae. Eyes $1 + 1$, the posterior pair being absent. They are uncoloured. On the occipital region the dorsal tubercles are fused medially, having $1 + 1$ setae. Th. I with $3 + 3$ tubercles having 1, 2, 1 setae each. Th. II, III with $4 + 4$ tubercles having 3, s + 2, 3 + s,—setae. Upon abd. I-III setae are arranged as 2, 2 + s, 2,—and upon abd. IV they are 2, 1 + s, 2,—. The dorsal tubercles of th. II- abd. IV are rather small and only one seta of them is large, others being setaceous. Upon abd. V dorsal tubercles are fused in one median large mass having $2 + 2$ setae, the anterior pair of which is short and setaceous. Lateral tubercle bearing s.s. on dorsal side. Upon abd. VI a pair of tubercles are well developed and remote to each other. All larger body setae uncoloured, blunt on apex and minutely serrated.

This is a distinct species having only $1 + 1$ eyes and peculiar mode of tuberculation of the trunk. It may be near cf. *cirrata* and cf. *novae-caledoniae*, but the tubercles of the head are quite different to those on either of them. In the form of body setae it is near the figure of Womersley's *Achorutes hirtellus* var. *schoetti* in 1935 (fig. 2, i), but, as stated below, we have no reliable data about this form.

Beside the species enumerated above we have two names which must be included in *Neanuridae*. They are:

1. *Achorutes hirtellus* var. *schoetti* Womersley, 1935

There are two slides determined var. *schoetti* by Womersley, one of which is from Millbrook Reservoir (type locality) and the other is from Kumara, New Zealand. The latter is nothing but *N. cf. cirrata* described above, while the former is a very striking new species having only one pair of tubercles upon abd. V. However, all body setae of

this example are quite smooth and as Womersley (1935, p. 209, fig. 2, i) has described the body setae of *schoetti* as minutely serrated, it would be better not to discuss the form at present.

2. *Paranura australasiae* Womersley, 1935

In all probability this is a kind of *Neanuridae* nearly related to *Lobella* (*Propeanura*) *australica* sp. n. with its reduced body tubercles.

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ZUSAMMENFASSUNG

Die Collembolen der Familie *Neanuridae*, gesammelt von Prof. Womersley und aufbewahrt in South Australian Museum, wurden mit neuem Gesichtspunkt untersucht. Es wurden dabei 9 Formen, unter denen 4 neuen Arten entdeckt. Alle diesen wurden mit eingehender Diagnose belegt.